
PHILOSOPHICAL
TRANSACTIONS.

Received January 24, 1768.

- I. *An Account of the Eruption of Mount Vesuvius, in 1767: In a Letter to the Earl of Morton, President of the Royal Society, from the Honourable William Hamilton, His Majesty's Envoy Extraordinary at Naples.*

Naples, December 29, 1767.

My Lord,

Read Feb. 11, 1768. **T**HE favourable reception, which my account of last year's eruption of Mount Vesuvius met with from your Lordship, the approbation which the Royal Society was pleased to shew, by having ordered the same to be printed in
VOL. LVIII. B their

their Philosophical Transactions, and your Lordship's commands in your letter of the 3d instant, encourage me to trouble you with a plain narrative of what came immediately under my observation during the late violent eruption, which began October 19, 1767, and is reckoned to be the 27th since that, which, in the time of Titus, destroyed Herculaneum and Pompeii.

The eruption of 1766 continued in some degree till the 10th of December, about nine months in all, yet in that space of time the mountain did not cast up a third of the quantity of lava, which it disgorged in only seven days, the term of this last eruption. On the 15th of December, last year, within the ancient crater of Mount Vesuvius, and about twenty feet deep, there was a crust, which formed a plain, not unlike the solfaterra in miniature; in the midst of this plain was a little mountain, whose top did not rise so high as the rim of the ancient crater. I went into this plain, and up the little mountain, which was perforated, and served as the principal chimney to the volcano; when I threw down large stones, I could hear that they met with many obstructions in their way, and could count a hundred moderately before they reached the bottom.

Vesuvius was quiet till March 1767, when it began to throw up stones, from time to time; in April the throws were more frequent, and at night fire was visible on the top of the mountain; or, more properly speaking, the smoak, which hung over the crater, was tinged by the reflection of the fire within the volcano. These repeated throws of cinders, ashes, and pumice stones, encreased the little
mountain

mountain so much, that in May its top was visible above the rim of the ancient crater. The 7th of August there issued a small stream of lava, from a breach in the side of this little mountain, which gradually filled the valley between it and the ancient crater; so that the 12th of September the lava overflowed the ancient crater, and took its course down the sides of the great mountain; by this time, the throws were much more frequent, and the red hot stones went so high as to take up ten seconds in their fall. Padre Torre, a great observer of Mount Vesuvius, says they went up above 1000 feet.

The 15th of October, the height of the little mountain (formed in about eight months) was measured by Don Andrea Pigonati, a very ingenious young man in his Sicilian majesty's service, who assured me that its height was 185 French feet.

From my villa, situated between Herculaneum and Pompeii, near the convent of the Calmaldolese (marked 7 in the inclosed Plan I.), I had watched the growing of this little mountain, and by taking drawings of it from time to time, I could perceive its increase most minutely; I make no doubt but that the whole of Mount Vesuvius has been formed in the same manner; and as these observations seem to me to account for the various irregular strata, which are met with in the neighbourhood of volcanos, I have ventured to enclose for your Lordship's inspection a copy of the abovementioned drawings.

The lava continued to run over the ancient crater in small streams, sometimes on one side, and some times on another, till the 18th of October, when I took particular notice that there was not the

least lava to be seen, owing, I imagine, to its being employed in forcing its way towards the place where it burst out the following day. As I had, contrary to the opinion of most people here, foretold the approaching eruption^a, and had observed a great fermentation in the mountain after the heavy rains, which fell the 13th and 14th of October, I was not surprised on the 19th following, at seven of the clock in the morning, to perceive from my villa every symptom of the eruption being just at hand. From the top of the little mountain issued a thick black smoak, so thick that it seemed to have difficulty in forcing its way out; cloud after cloud mounted with a hasty spiral motion, and every minute a volley of great stones were shot up to an immense height in the midst of these clouds; by degrees, the smoak took the exact shape of a huge pine tree, such as Pliny the younger described in his letter to Tacitus, where he gives an account of the fatal eruption in which his uncle perished^b. This column of black smoak,

^a This plainly appears from the following extract of a letter, from the same gentleman to the president, dated Naples, October 6, 1767. "Mount Vesuvius is preparing for another eruption, or rather a second part of the last, as it has never been quiet since the beginning of the year 1765. The lava already runs over the crater; and by the quantity of stones and ashes, the montagnola has almost filled the crater, and has risen at least 80 feet within these last three months."

^b These are his words. "Nubes (incertum procul intuentibus ex quo monte Vesuvium fuisse postea cognitum est) oriebatur, cujus similitudinem & formam, non alia magis arbor, quam pinus expresserit. Nam longissimo veluti trunco elata in altum, quibusdam ramis diffundebatur, credo quia recenti spiritu evecta, dein senescente eo destituta, aut etiam pondere suo victa, in latitudinem evanescebat: candida interdum, interdum fordida & maculosa, prout terram cineremve sustulerat." Plin. Lib. VI. Ep. 16.

after

after having mounted an extraordinary height, bent with the wind towards Caprea, and actually reached over that island, which is not less than 28 miles from Vesuvius.

I warned my family not to be alarmed, as I expected there would be an earthquake at the moment of the lava's bursting out; but before eight of the clock in the morning I perceived that the mountain had opened a mouth, without noise, about 100 yards lower than the ancient crater, on the side towards the Monte di Somma; and I plainly perceived, by a white smoke, which always accompanies the lava, that it had forced its way out: as soon as it had vent, the smoke no longer came out with that violence from the top. As I imagined that there would be no danger in approaching the mountain when the lava had vent, I went up immediately, accompanied by one peasant only. I passed the hermitage (3. in Plan 1.), and proceeded as far as the spot marked (x), in the valley between the mountain of Somma and that of Vesuvius, which is called Atrio di Cavallo. I was making my observations upon the lava, which had already, from the spot (E) where it first broke out, reached the valley, when, on a sudden, about noon, I heard a violent noise within the mountain, and at the spot (C) about a quarter of a mile off the place where I stood, the mountain split; and, with much noise, from this new mouth a fountain of liquid fire shot up many feet high, and then like a torrent rolled on directly towards us. The earth shook at the same time, that a volley of pumice stones fell thick upon us; in an instant, clouds of black smoke and ashes caused almost a total darkness; the explosions

fions from the top of the mountain were much louder than any thunder I ever heard, and the smell of the sulphur was very offensive. My guide alarmed took to his heels ; and I must confess that I was not at my ease. I followed close, and we ran near three miles without stopping ; as the earth continued to shake under our feet, I was apprehensive of the opening of a fresh mouth, which might have cut off our retreat. I also feared that the violent explosions would detach some of the rocks off the mountain of Somma, under which we were obliged to pass ; besides, the pumice-stones, falling upon us like hail, were of such a size as to cause a disagreeable sensation upon the part where they fell. After having taken breath, as the earth still trembled greatly, I thought it most prudent to leave the mountain, and return to my villa, where I found my family in a great alarm at the continual and violent explosions of the volcano, which shook our house to its very foundation, the doors and windows swinging upon their hinges. About two of the clock in the afternoon another lava forced its way out of the same place from whence came the lava last year, at the spot marked B (in Plan II.), so that the conflagration was soon as great on this side of the mountain as on the other, which I had just left.

The noise and smell of sulphur encreasing, we removed from our villa to Naples ; and I thought proper, as I passed by Portici, to inform the court of what I had seen ; and humbly offered it as my opinion, that his Sicilian majesty should leave the neighbourhood of the threatening mountain. However, the court did not leave Portici till about twelve of the clock, when the lava had reached as far as

(4. in

(4. in Plan. I.) I observed, in my way to Naples, which was in less than two hours after I had left the mountain, that the lava had actually covered three miles of the very road through which we had retreated. It is astonishing that it should have run so fast; as I have since seen, that the river of lava, in the Atrio di Cavallo, was 60 and 70 feet deep, and in some places near two miles broad. When his Sicilian majesty quitted Portici, the noise was greatly increased, and the confusion of the air from the explosions was so violent, that, in the king's palace, doors and windows were forced open, and even one door there, which was locked, was nevertheless burst open. At Naples, the same night, many windows and doors flew open; in my house, which is not on the side of the town next Vesuvius, I tried the experiment of unbolting my windows, when they flew wide open upon every explosion of the mountain. Besides these explosions, which were very frequent, there was a continued subterraneous and violent rumbling noise, which lasted this night about five hours. I have imagined that this extraordinary noise might be owing to the lava in the bowels of the mountain having met with a deposition of rain water, and that the conflict between the fire and the water may, in some measure, account for so extraordinary a crackling and hissing noise. Padre Torre, who has wrote so much and so well upon the subject of Mount Vesuvius, is also of my opinion; and indeed it is natural to imagine, that there may be rain water lodged in many of the caverns of the mountain, as, in the great eruption of Mount Vesuvius in 1663, it is well attested, that several towns,
among

among which Portici and Torre del Greco, were destroyed by a torrent of boiling water having burst out of the mountain with the lava, by which thousands of lives were lost. About four years ago, Mount Etna in Sicily threw up hot water also, during an eruption.

The confusion at Naples this night cannot be described; his Sicilian majesty's hasty retreat from Portici added to the alarm; all the churches were opened and filled, the streets were thronged with processions of saints; but I shall avoid entering upon a description of the various ceremonies that were performed in this capital, to quell the fury of the turbulent mountain.

Tuesday the 20th, it was impossible to judge of the situation of Vesuvius, on account of the smog and ashes which covered it entirely, and spread over Naples also, the sun appearing as through a thick London fog, or a smoked glass; small ashes fell all this day at Naples. The lavas on both sides of the mountain ran violently; but there was little or no noise till about nine o'clock at night, when the same uncommon rumbling began again, accompanied with explosions as before, which lasted about four hours; it seemed as if the mountain would split in pieces; and, indeed, it opened this night almost from the spot E to C (in Plan I.). The inclosed plans were taken upon the spot at this time, when the lava's were at their height; and I do not think them exaggerated. The Parisian barometer was, as yesterday, at 27. 9, and Fahrenheit's thermometer at 70 degrees; whereas, for some days preceding the eruption, it had been at 65 and 66. During the
confusion

confusion of this night the prisoners in the publick jail attempted to escape, having wounded the jailer, but were prevented by the troops. The mob also set fire to the cardinal archbishop's gate, because he refused to bring out the relicks of Saint Januarius.

Wednesday 21st was more quiet than the preceding days, though the lavas ran briskly. Portici was once in some danger, had not the lava taken a different course, when it was only a mile and a half from it; towards night the lava slackened.

Thursday 22d, about ten of the clock in the morning, the same thundering noise began again, but with more violence than the preceding days; the oldest men declared they had never heard the like, and, indeed, it was very alarming; we were in expectation every moment of some dire calamity. The ashes, or rather small cinders, showered down so fast, that the people in the streets were obliged to use umbrellas, or flap their hats, these ashes being very offensive to the eyes. The tops of the houses, and the balconies, were covered above an inch thick with these cinders. Ships at sea, twenty leagues from Naples, were also covered with them, to the great astonishment of the sailors. In the midst of these horrors, the mob growing tumultuous and impatient, obliged the cardinal to bring out the head of Saint Januarius, and go with it in procession to the Ponte Maddalena, at the extremity of Naples, towards Vesuvius; and it is well attested here, that the eruption ceased the moment the Saint came in sight of the mountain; it is true the noise ceased about that time, after having lasted five hours, as it had done the preceding days.

Friday 23d, the lavas still ran, and the mountain continued to throw up quantities of stones from its crater; there was no noise heard at Naples this day, and but little ashes fell there.

Saturday 24th, the lava ceased running; the extent of the lava, from the spot C (Plan I.), where I saw it break out, to its extremity F, where it surrounded the chapel of Saint Vito, is above six miles. In the Atrio di Cavallo, and in a deep valley, that lies between Vesuvius (1.), and the hermitage (3.), the lava is in some places near two miles broad, and in most places from 60 to 70 feet deep; at (4.) the lava ran down a hollow way, called Fossa grande, made by the currents of rain water; it is not less than 200 feet deep, and 100 broad; yet the lava in one place has filled it up. I could not have believed that so great a quantity of matter could have been thrown out in so short a time, if I had not since examined the whole course of the lava myself. This great compact body will certainly retain some heat many months; at this time, much rain having fallen for some days past, the lava smoaks, as if it ran a-fresh: and about ten days ago, when I was up the mountain with Lord Stormont, we thrust sticks into the crevices of the lava, which took fire immediately: But to proceed with my journal.

The 24th Vesuvius continued to throw up stones as on the preceding days; during the whole of this eruption it had differed in this circumstance from the eruption of 1766, when no stones were thrown out of the crater from the moment the lava ran freely.

Sunday 25th, small ashes fell all day at Naples; they issued from the crater of the volcano, and formed

a vast column, as black as the mountain itself, so that the shadow of it was marked out on the surface of the sea; continual flashes of forked, or zig-zag lightning shot from this black column, the thunder of which was heard in the neighbourhood of the mountain, but not at Naples; there were no clouds in the sky at this time, except those of smoak issuing from the crater of Vesuvius. I was much pleased with this phænomenon, which I had not seen before in that perfection.

Monday 26th, the smoak continued, but not so thick, neither were there any flashes of the mountain lightning. As no lava has appeared after this column of black smoak, which must have been occasioned by some inward operation of fire, I am apt to think that the lava, which should naturally have followed this symptom, has broke its way into some deeper cavern, where it is silently brooding future mischief; and I shall be much mistaken if it does not break out a few months hence.

Tuesday 27th, no more black smoak, nor any signs of eruption.

Thus, My Lord, I have had the honor of giving your Lordship a faithful narrative of my observations during this eruption, which is universally allowed to have been the most violent of this century; and I shall be happy if it should meet with your approbation, and that of the Royal Society, if your Lordship should think it worthy of being communicated to so respectable a body.

I have just sent a present to the British Museum of a compleat collection of every sort of matter produced by Mount Vesuvius, which I have been col-

lecting with some pains for these three years past ; and it will be a great satisfaction to me if, by the means of this collection, some of my countrymen, learned in natural history, may be enabled to make some useful discoveries relative to volcanos ^c.

I have also accompanied that collection with a current of lava from Mount Vesuvius ; it is painted with transparent colours, and, when lighted up with lamps behind it, gives a much better idea of Vesuvius, than is possible to be given by any other sort of painting.

I have the honor to be,

My Lord,

Your Lordship's

most obedient,

and most humble servant,

William Hamilton.

^c “ I am well convinced, by this collection, that many variegated marbles, and many precious stones, are the produce of volcanos ; and that there have been volcanos in many parts of the world, where at present there are no traces of them visible.” This is taken from a prior letter of Mr. Hamilton, to the President, dated April 7, 1767.



Eruption of Mount Vesuvius



Eruption of Mount Vesuvius in 1767, from Portici.



P L A T E I.

- A. Crater of Mount Vesuvius.
 - B. Mouth from whence came the lava of 1766 ;
and which opened afresh, October 19, 1767,
and produced the conflagration represented
in Plan II.
 - C. The mouth which opened at 12 o'clock, Oc-
tober 19, 1767, whilst I was at the spot
marked x; from thence came all the lava
represented in Plan I.
 - D. The lava.
 - E. Mouth from whence the lava flowed at eight
o'clock, October 19, when the eruption be-
gan first.
 - F. Chapel of Saint Vito surrounded with lava.
1. Vesuvius.
 2. Mountain of Somma.
 3. Hermitage, between which and Vesuvius there
is a deep valley two miles broad.
 4. The Fossa Grande.
 5. His Sicilian Majesty's Palace at Portici.
 6. Church of Pugliano.
 7. Calmaldolese Convent, near which is my Villa.
 8. Saint Torio.
 9. Barra.
 10. Spot, under which lies Herculaneum.

P L A T E II.

- A. Crater of Vesuvius.
- B. Mouth, from whence came the lava of 1766, and which opened afresh at two o'clock, October 19, 1767, and caused the conflagration on this side of the mountain.
- C. Mouth which opened at 12 o'clock, October 19, 1767, whilst I was at the spot X, and which produced all the lava represented in Plan I.
- D. Rivulets of lava, which flowed from the crater, and united with the great river E.
- F. Extremities of the lava, about five miles from B.

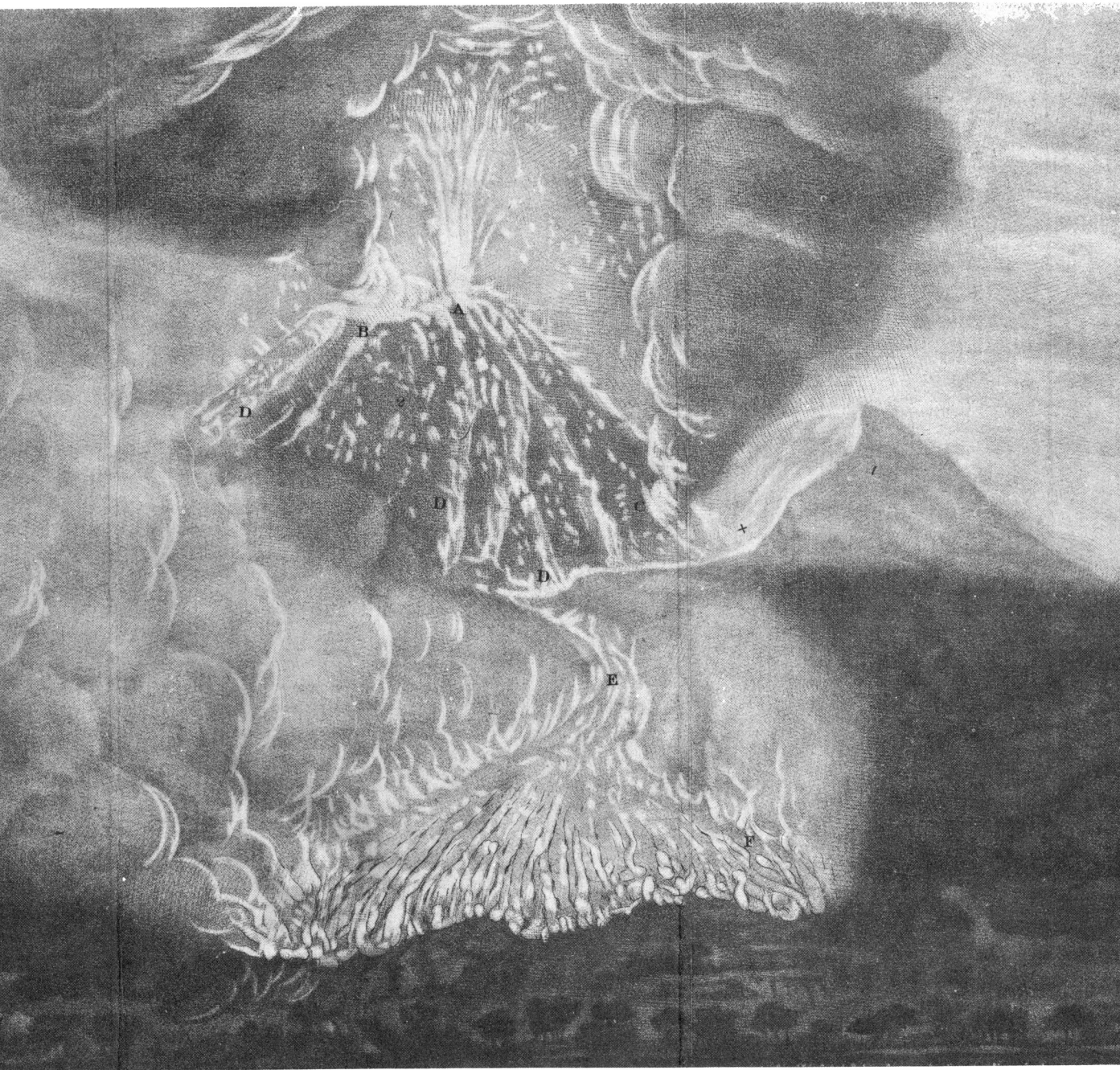
- 1. Mountain of Somma.
- 2. Mount Vesuvius.
- 3. Montagna di Trecafe.
- 4. Trecafe.
- 5. Oratorio di Bosco.
- 6. Ottaiano.

P L A T E III.

Views of the gradual increase of the little mountain within the ancient crater; and of the present shape of Mount Vesuvius.

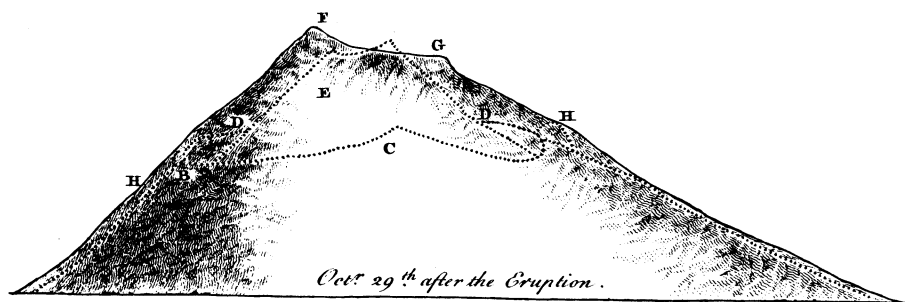
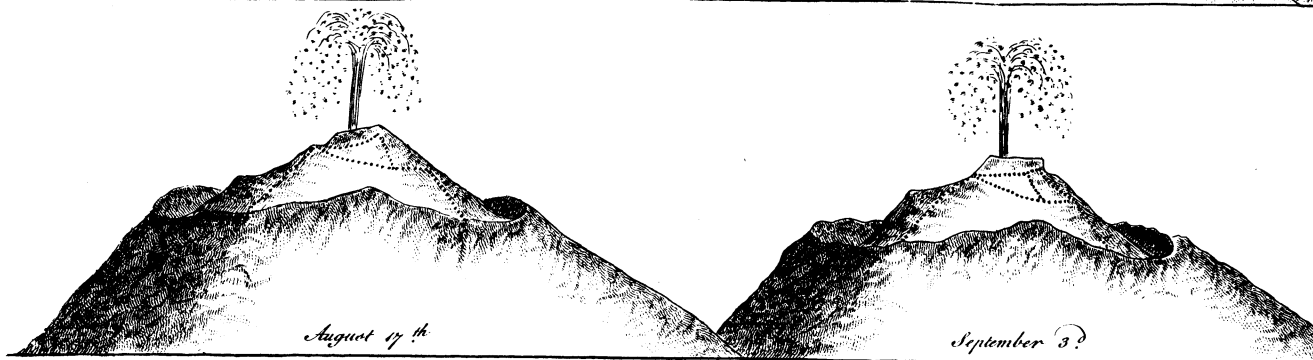
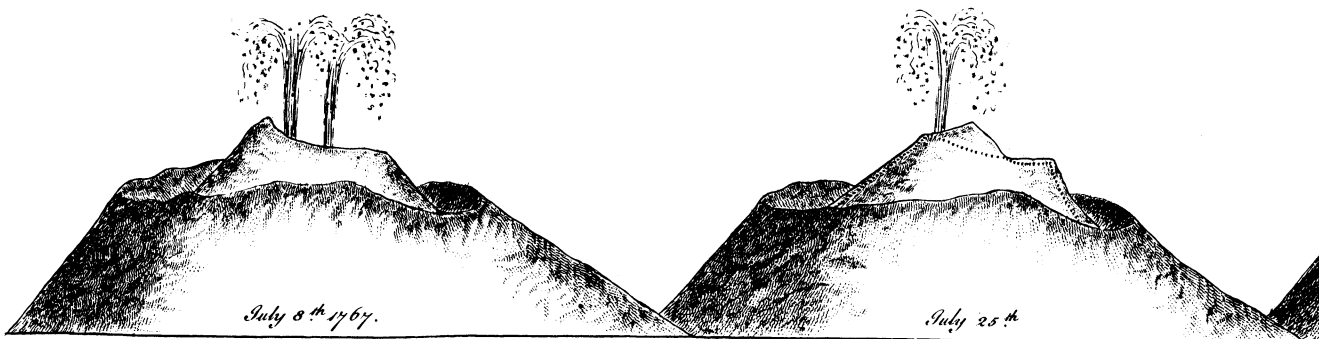


Eruption of Mount Vesuvius

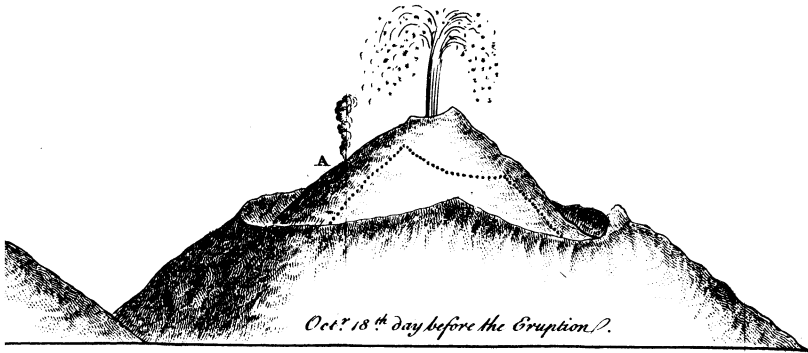
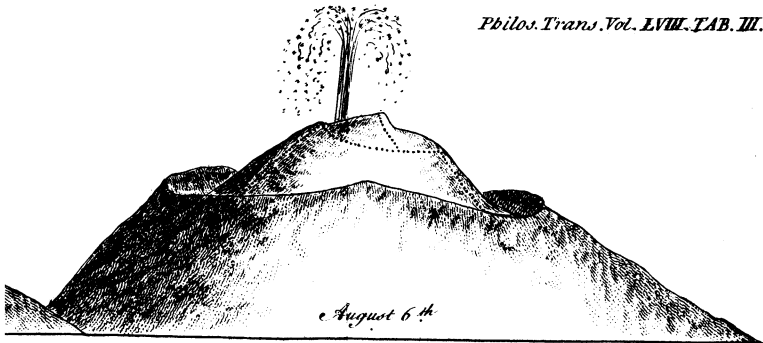


Eruption of Mount Vesuvius in 1767. from Bosco.

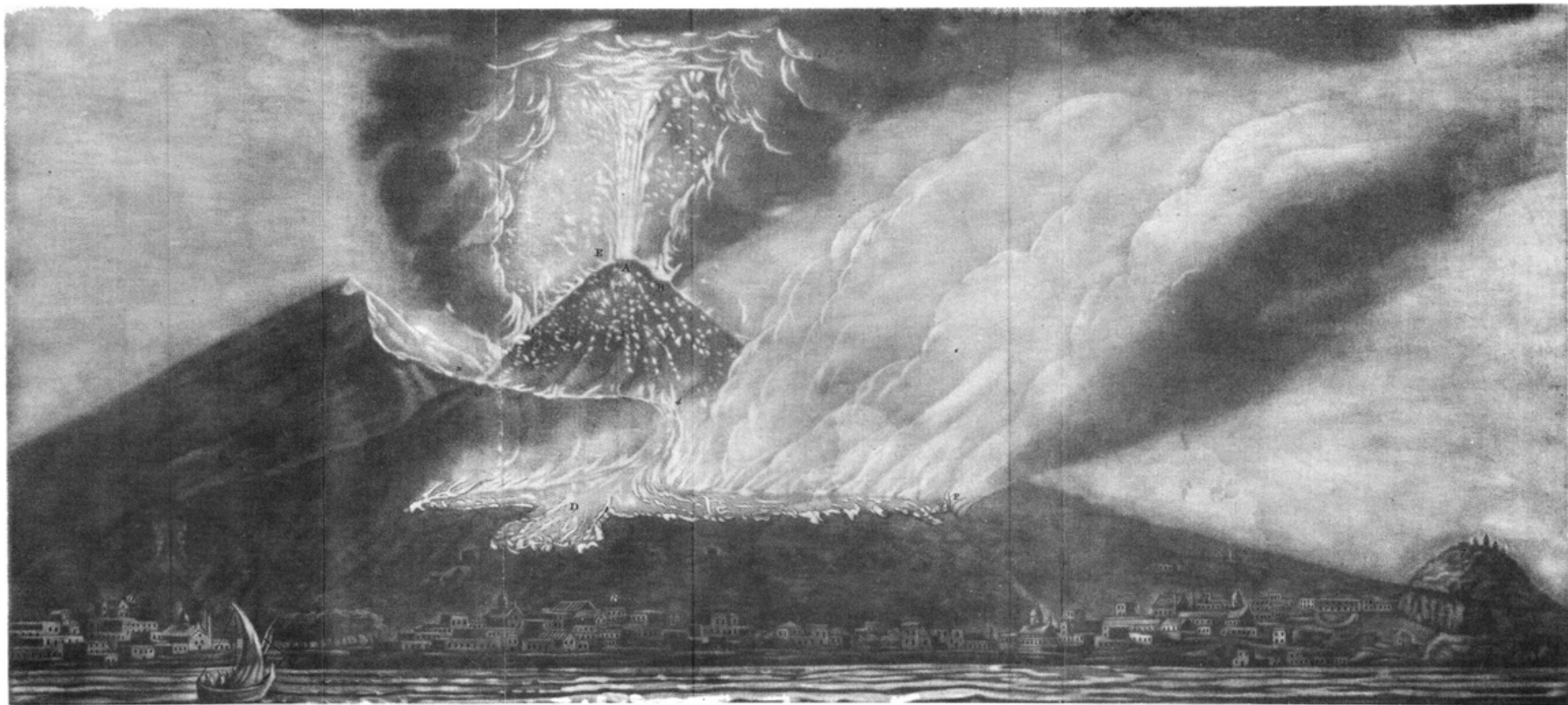




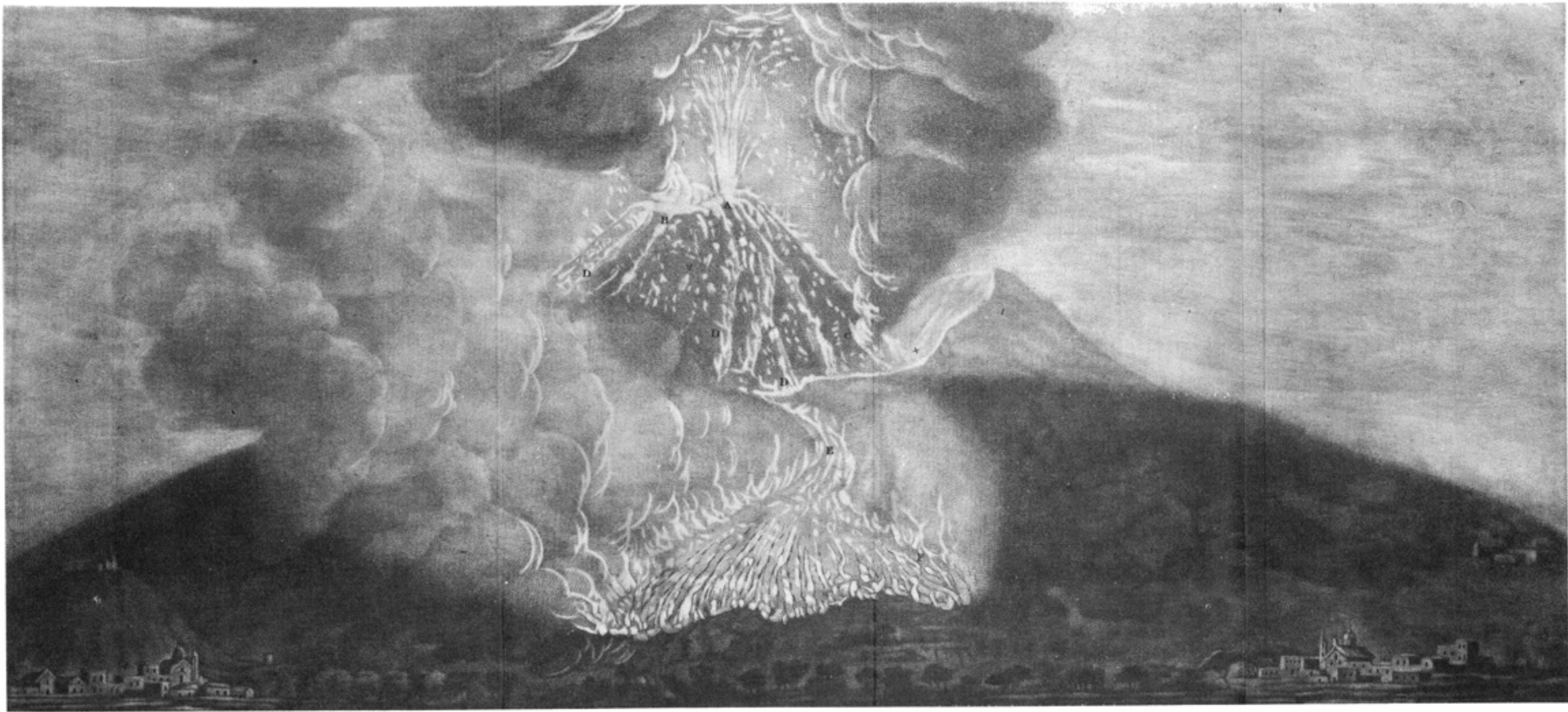
The *ancient*
 With the gradual increase
 The exterior black line marks the
 little Mountain before that increase
 Size of the little Mountain July 8th
 before the great Eruption. 2.
 the day before the Eruption, &c.
 present shape of the top of the
 increased from B. to F. which



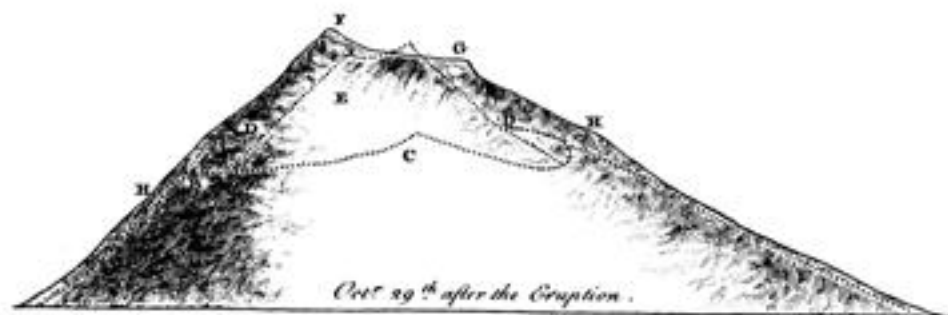
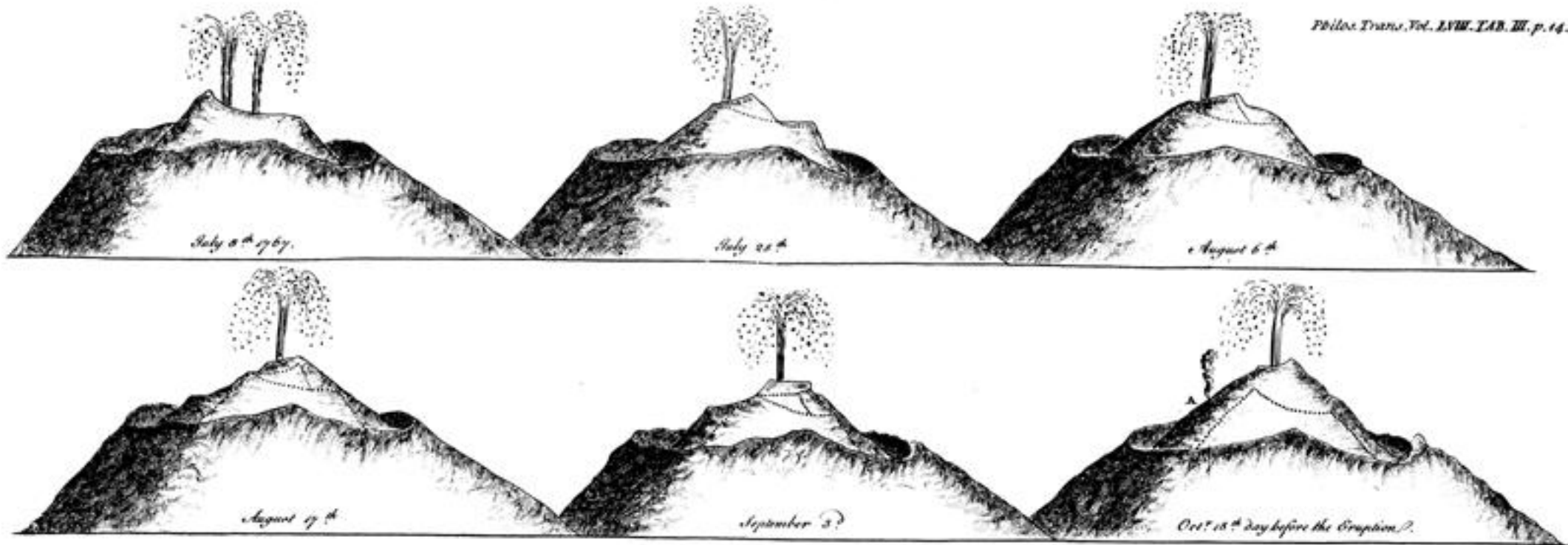
ancient Crater of Mount Vesuvius
 gradual increase of the little Mountain within the Crater
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 in July 8th the little spot A. marks where the lava came out some days
 ction ? B. C. D. mark the ancient Crater & E. the little Mountain
 ction, F. G. is the present Crater, & the exterior black line H. F. G. the
 top of Mount Vesuvius. Since May last the Mountain is
 3. which is near 200 feet.



Eruption of Mount Vesuvius in 1767. from Portici.



Eruption of Mount Vesuvius in 1767. from Bosco.



The ancient Crater of Mount Vesuvius

*With the gradual increase of the little Mountain within the Crater
 the exterior black line marks each increase, & the interior dotted line shews the state of the
 little Mountain before that increase, so that the dotted line in the Drawing of Oct^r 18th shews the
 size of the little Mountain July 5th the little spot x. marks where the lava came out some days
 before the great Eruption. ? x.c.d. mark the ancient Crater & x. the little Mountain
 the day before the Eruption, x.c. is the present Crater, & the exterior black line x.x.c. the
 present shape of the top of Mount Vesuvius. Since May last the Mountain is
 increased from x. to y. which is near 200 feet.*